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Why is Corruption Less Harmful in Some Countries Than in Others?*

Keith Blackburn† and Gonzalo F. Forgues-Puccio‡

Abstract

Empirical evidence shows that not all countries with high levels of corruption have suffered poor growth performance. Bad quality governance has clearly been much less damaging (if at all) in some economies than in others. Why this is so is a question that has largely been ignored, and the intention of this paper is to provide an answer. We develop a dynamic general equilibrium model in which growth occurs endogenously through the invention of new goods based on research and development activity. For such activity to be undertaken, firms must acquire complementary licenses from public officials who are able to exploit their monopoly power by demanding bribes in exchange for these (otherwise free) permits. We show that the effects of corruption depend on the extent to which bureaucrats coordinate their rent-seeking behaviour. Specifically, our analysis predicts that countries with organised corruption networks are likely to display lower levels of bribes, higher levels of research activity and higher rates of growth than countries with disorganised corruption arrangements.

Keywords: Organised corruption, disorganised corruption, innovation, growth.

JEL classification: D73, O11, O31, O41.

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1 Introduction

There is now a broad consensus amongst development experts that the quality of governance plays a vital role in shaping the fortunes of an economy. Bad quality governance fosters corruption, which can lead to inefficiencies and resource costs that impede economic progress.[1] This view is supported by a large empirical literature that has flourished over recent years as a result of new and improved measures of corrupt activity. Armed with such data, a number of authors have undertaken analyses which reveal that corruption has significant adverse effects on growth (e.g., Gyimah-Brempong 2002; Keefer and Knack 1997; Knack and Keefer 1995; Li et al. 2000; Mauro 1995; Mo 2001; Sachs and Warner 1997). These, and other, investigations have also indicated various ways in which corruption takes hold, such as lowering rates of investment (e.g., Mauro 1995), creating obstacles to doing business (e.g., World Bank 2002), reducing inflows of foreign investment (e.g., Wei 2000) and causing misallocations of public expenditures (e.g., Mauro 1997; Tanzi and Davoodi 1997). The scale of the offences involved, and the ingenuity of those that perpetrate them, are often quite staggering, as a wealth of anecdotal evidence reveals. Given all of this, it is not surprising that most, if not all, international development agencies have made the fight against corruption a leading, if not the foremost, priority in their agendas for alleviating poverty.[2]

It is undoubtedly true that many countries of the world have suffered, and continue to suffer, as a result of widespread misgovernance. Yet it is also true that there are some countries for which high levels of corruption have appeared to do little to damage growth prospects. The most prominent examples are to be found in South-East Asia, motivating what Wedeman (2002a) has labelled the "East Asian paradox". Countries such as China, Indonesia, South Korea and Thailand have all enjoyed considerable growth in their per-capita incomes whilst enduring the reputation of being mired with corruption. There are even some developed countries (most notably, Italy) that share the same notoriety. Such observations suggest that there

[1] The most commonly-used definition of corruption is the abuse of public office for personal gain. Governance is defined rather more broadly than this, though the two concepts are intimately connected: just as bad governance fosters corruption, so corruption undermines good governance.

[2] For numerous accounts of corrupt practices and strategies for combatting them, see the web-sites of the World Bank (www.worldbank.org/publicsector/anticorrupt), the IMF (www.imf.org/external/np/exp/facts/gov.htm), the United Nations (www.unodc.org/unodc/en/corruption.htm/) and the Free Africa Foundation (www.freeafrica.org). For broad surveys of the literature on corruption, see Bardhan (1997), Jain (2001), Rose-Ackerman (1999) and Tanzi (1998). And for an up-to-date review of the empirical evidence on corruption, see Lambsdorff (2006).

is more to the relationship between corruption and development than one is typically led to believe. Indeed, it would appear that, in some instances, this relationship is rather fragile and tenuous.

By way of illustrating the above, we present some summary statistics in Table 1, constructed using cross-country data on growth from the Penn World Table and cross-country data on corruption from Transparency International.[3] We report the average growth rates and average corruption ratings over the period 1980-1999 for selected regions of the world - the lesser developed, and reputedly more corrupt, regions. As is seen, these regions share similar corruption ratings, but their growth performances are very different. The sub-Saharan African and Latin American zones provide the classic examples where high corruption is accompanied by low growth.[4] This is not observed, however, for the South and South-East Asian zone. A closer look at this region reveals some interesting features. In accordance with the findings of others (e.g., Hutchcroft 1994, 2000; Khan 1998, 2000; Lee 1995, 2000; Rock 1999, 2000; Wedeman 2002b), we may divide the region into three distinct groups of countries: the low corruption and high growth economies of Hong Kong, Malaysia and Singapore; the high corruption and low growth economies of the Philippines and South Asia; and the high corruption and high growth economies of China, Indonesia, South Korea and Thailand. Naturally, the question that arises is what is so special about this last group of countries that has enabled them to grow in spite of being saddled with poor quality governance? How might one explain this East Asian paradox? More

[3]The latter of these datasets is originally given as a "transparency perception index" (TPI), which ranks countries in terms of perceived levels of corruption on a decreasing scale from 10 to 0. This index is constructed as a "poll of polls", combining the results of questionnaire surveys sent by various organisations to networks of correspondents around the world. It was first published in 1995 and has since been updated annually. For periods prior to this, Transparency International provide similar indices using data compiled previously by other organisations (including Business International Corporation, Political Risk Services Incorporated, Political and Economic Risk Consultancy and the Institute for Management Development). The average corruption scores reported in Table 1 are obtained by taking averages of the indices for the periods 1980-85, 1988-82 and 1995-1999. As is common practice, we apply a simple transformation to convert the TPI into a "corruption perception index" (CPI) which measures the level of corruption on an increasing scale from 0 to 10. The transformation is given by CPI value = 10 − TPI value. Further details about both our corruption and growth data can be found by visiting the appropriate web-sites, www.transparency.org/surveys/index.html♯ and pwt.econ.upenn.edu/php_site/pwt_index.php.

[4]There are some notable outliers in these regions that deserve a mention. Botswana, for example, is often heralded as Africa's success story, having seemingly been able to control corruption and enjoy high growth. Likewise, Chile has distinguished itself in Latin America by establishing a similar track record.

generally, why might corruption be less harmful in some countries than in others?[5]

One possible answer to the above questions is related to the empirical results of Neeman et al. (2008), who re-examine the negative relationship between corruption and development on the basis of the degree of openness of economies. Using a variety of model specifications, it is found that this relationship holds only for countries that are very open, especially in terms of their financial integration with the rest of the world. For countries that are not very well integrated, the relationship more-or-less disappears. An obvious explanation for this is that fewer restrictions on cross-border financial transactions makes it easier for corrupt individuals to hide their illegal income by laundering it abroad. As such, the incentives to engage in corruption, and the effects thereof, are likely to be much greater in this case than in a less liberalised environment where resources cannot be syphoned off so easily. This idea may well have some truth in it, but it does not resolve the puzzle of the East Asian experience. As far back as the 1980s, countries such as Indonesia, Thailand and South Korea were classified as open economies (e.g., Sachs and Warner 1995); yet corruption in these countries has been much less destructive (if at all) than corruption in other nations of the world.

Another possible answer to the questions is given by the so-called "speed money" hypothesis of corruption. According to this, corrupt transactions between private and public agents are a means of circumventing cumbersome and pervasive regulations (red tape) that are detrimental to efficiency (e.g., Huntington 1968; Leff 1964; Leys 1970). This argument - an application of the theory of the second best - views bribery and other forms of kickback, not as any hindrance to the economy, but as convenient devices for overcoming institutional hurdles that distort incentives and opportunities. Whilst plausible at first glance, the argument can be challenged on both conceptual and empirical grounds. Conceptually, there are at least two main problems: first, although bribery may speed up individual transactions with bureaucrats, both the sizes of bribes and the number of transactions may increase so as to produce an overall net loss in efficiency; second, and more fundamentally, the distortions that bribes are meant to mitigate are often the result of corrupt practices to begin with and should therefore be treated as endogenous, rather than exogenous, to the bureaucratic process. Empirically, the evidence offers very little support to the hypothesis: in Ades and

[5]The same questions are invited from the results of some simple regressions, which paint a similar picture to the above. For example, the correlation between growth and corruption is signifcantly negative for sub-Saharan African and Latin American countries, but is only so for South and South-East Asian countries when China, Indonesia, South Korea and Thailand are excluded from the sample.

Di Tella (1997), Mauro (1995) and Meon and Sekkat (2005), it is found that the correlation between growth and corruption is consistently negative (and particularly strong) in samples of countries with reputedly high levels of red tape, weak rules of law and widespread government inefficiencies (the type of environment where the argument is most relevant). In Kaufmann and Wei (2000), it is found that the use of bribes to speed up the bureaucratic process is largely self-defeating, as the amount of time negotiating bribes increases.

A final possible answer to the questions is suggested in the discussion of Shleifer and Vishny (1993) on the organisation of corruption. The basic idea has to do with the fact that, in order to conduct business, individuals often need to procure several different types of governmental good (licenses, permits, certificates, etc.) that are complements to each other and that are provided by different governmental agencies or departments. Under such circumstances, the extent to which public officials are organised in their extraction of bribes can have an important influence on the consequences of bribery. If bureaucrats are disorganised and act as independent monopolists, then each of them will seek to maximise his individual bribe income without taking into account the negative effect of this on the bribe-taking capacity of others. This effect arises since the demand for a bribe by one bureaucrat in exchange for his own governmental good imposes a pecuniary externality on other bureaucrats by reducing the demand for their governmental goods and, with this, their ability to profit from corruption. By contrast, if bureaucrats are organised and act as a joint monopoly, then they will strive to maximise their total bribe income and, in doing so, will internalise any externalities. In this way, a centralised network of collusive corruption can lead to a lower level of bribe payment, a greater provision of governmental goods and a smaller scale of distortions than would arise under a decentralised network of non-collusive corruption.[6] This argument has a good deal of merit and its application to the East Asian experience is particularly relevant. As noted above, this region appears to be divided into three distinct groups of countries: the first - comprising Hong Kong, Malaysia and Singapore - are the low corruption and high growth economies in which corrupt practices have been

[6]As also indicated by Shleifer and Vishny (1993), it is possible to obtain the opposite result if governmental goods are substitutes for each other, or if the same governmental good is provided by more than one bureaucrat. In this case competition between bureaucrats in the absence of collusion could drive down the level of bribes relative to the monopoly outcome in the presence of collusion. As noted by others, however, the conditions for ensuring a competitive equilibrium (such as zero search costs for individuals in their acquisition of information about bribe payments, and zero capacity constraints on bureaucrats in their supply of governmental goods) are fairly stringent and not obviously satisfied in practice (e.g., Bose 2004).

curbed by strong autonomous states; the second - consisting of the Philippines and South Asia - are the high-corruption and low-growth economies in which disorganised corrupt behaviour has flourished; and the third - consisting of China, Indonesia, South Korea and Thailand - are the high-corruption and high-growth economies in which organised corrupt activity has thrived. Some recent evidence lends support to the view that the effects of corruption depend not only on the scale of illegal profiteering, but also on the nature of this profiteering. In particular, it has been found that corruption reduces investment by less when it is more predictable (more organised), and that corruption and investment have displayed a positive correlation in the large newly-industrialised East Asian economies that have centralised (organised) corruption networks (e.g., Campos et al. 1999; Rock and Bonnet 2004).[7]

Theoretical research on the organisation of corruption has not progressed much further since the seminal contribution by Shleifer and Vishny (1993). An exception is the recent analysis of Celentani and Ganuza (2002), who develop a game-theoretic model in which one group of agents (a constituency) appoints another group of agents (bureaucrats) to ensure some prescribed level, or quality, of activity (e.g., production) on the part of a third group of agents (providers). The constituency is aware that a bureaucrat and a provider may collude with each other in such a way that the former allows the latter to engage in sub-standard activity in return for a bribe. Higher levels of corruption prompt the constituency to set lower levels of required activity, which reduce the gains from corrupt behaviour. Against this background, it is shown how an organised syndicate of corrupt bureaucrats would maximise its illegal income by limiting the number of corrupt transactions, a consideration that does not arise in a disorganised network of rent-seeking officials. As a consequence, the incidence of corruption (quality of activity) is lower (higher) when such a syndicate exists than when it does not.

The present paper seeks to explore further the implications of alternative bureaucratic structures for the impact of corruption on economic performance. As far as we know, it shares the distinction of only one other analysis in studying the issue from an explicitly macroeconomic (growth) perspective. That other analysis is by Ehrlich and Lui (1999), who focus on the question of how opportunities to profit from bureaucratic malpractice may compromise growth by distorting occupational choice. The basic idea is that such opportunities create incentives for individuals to devote less resources towards growth-promoting activities (investments in human capital)

[7]It is worth noting that such networks are also a feature of some developed economies that have a relatively high corruption rating (e.g., Italy). As regards the predictability of corruption, we comment more on this issue in a later discussion.

and more resources towards power-seeking activities (investments in political capital).[8] Within this context, the authors make a distinction between a centralised bureaucracy (in which bureaucrats act as a joint monopolist) and a decentralised bureaucracy (in which bureaucrats compete over relative personal power). Amongst other findings, it is shown how growth may be higher in the case of the former than in the case of the latter.

Our analysis differs from that of Ehrlich and Lui (1999) in a number of respects. Most notably, our focus is on the role of corruption in entry regulation and the costs of doing business. The framework we use is a dynamic general equilibrium model in which growth occurs endogenously through the invention and manufacture of new intermediate goods that serve as inputs in the production of final output. Inventive activity (research and development) is undertaken by entrepreneurs who require various licenses from public officials in order to embark on this activity. These licenses are complementary in the sense that all of them must be procured - otherwise, an entrepreneur is unable to engage in any research venture. All bureaucrats are corrupt and each one of them exploits his monopoly over the issue of a license by demanding a bribe in exchange for it. We study the implications of this when bureaucrats act either individualistically (disorganised corruption) or collectively (organised corruption). These different scenarios can be likened to the above distinction between decentralised and centralised bureaucracies, though the distinction in our case is not a question of whether bureaucrats are engaged in some form of competition with each other (there is no such rivalry in our model), but rather refers to the extent to which bureaucrats coordinate their rent-seeking behaviour. Given this, we show that bribe payments are lower, innovation activity is higher and growth is higher when such behaviour is organised than when it is disorganised. In this way our analysis sheds light on the issue of why the effects of corruption on growth appear to be so different across countries.

We emphasise that our analysis is not meant as a prescription for the organisation of corruption. Whether organised or not, corruption is always bad for development in our model and the best outcome is achieved when it does not exist at all. The precise effect of corruption is to limit entry into productive activities, an effect that appears prevalent in many countries where opportunities are often restricted by the illicit costs of complying with numerous procedures and regulations.[9] Corruption is often seen as a form of taxation, though one important difference in the case of entry regulation is

[8] In a static context, other authors have attended to similar considerations regarding the misallocation of talent (e.g., Murphy et al. 1991, 1993).

[9] This is exemplified by much anecdotal and empirical evidence, as we discuss later in the paper.

that, unlike taxes, bribe payments are made before productive ventures are embarked upon. This can deter such ventures at the outset and may bias entry towards those most able to afford it.

It is still true to say that most theoretical research on corruption has so far been conducted at the microeconomic level, using partial equilibrium models to study specific questions and issues about the nature of corrupt behaviour and the implications for efficiency and welfare (e.g., Andvig and Moene 1990; Banerjee 1997; Cadot 1987; Klitgaard 1988, 1990; Rose-Ackerman 1975, 1978, 1999; Shleifer and Vishny 1993). Rather less research has been devoted towards understanding the macroeconomics of misgovernance (particularly from a development perspective), though the literature is steadily growing.[10] In addition to Ehrlich and Lui (1999), Sarte (2000) is credited with providing one of the first contributions in the area, demonstrating how corruption may cause resources to be diverted away from the formal (more efficient) sectors of the economy towards the informal (less efficient) sectors. More recently, Blackburn et al. (2006) reveal how corruption and development may interact with each other to produce threshold effects and multiple (history-dependent) long-run equilibria, including a poverty trap equilibrium. Similar results are established in Blackburn and Forgues-Puccio (2007), who also show how corruption can foster inequality by compromising the effectiveness of redistributive policy, and in Blackburn and Sarmah (2008), who show how corruption can influence demographic outcomes (life expectancy in particular) through its impact on the provision of public health expenditures. Finally, Rivera-Batiz (2001) illustrates the potentially adverse growth implications of financial liberalisation when corruption is left unchecked. With the exception of Ehrlich and Lui (1999), none of these analyses address the issue of how different types of corrupt behaviour may have different consequences for the economy.[11]

As indicated by much of the above literature (especially the microeconomic literature), academic interest in corruption predates the emergence of the issue as an item of utmost (if not foremost) priority on the international development agenda. The high prominence that the issue now commands (more than ever before) is due in large part to the rapid accumulation of

[10] In a purely static context, Acemoglu and Verdier (1998, 2000) conduct a general equilibrium analysis of how corruption may form part of an optimal allocation in which market failure is traded off against government failure.

[11] To focus on this issue, our analysis abstracts from the potential endogeneity of corruption, as studied by Blackburn et al. (2006) and Blackburn and Forgues-Puccio (2007). Rather, we follow the approach of others (e.g., Rivera-Batiz 2001; Sarte 2000) by taking, as given, the absence or presence of corrupt behaviour, and comparing the implications of these different scenarios.

empirical evidence based on newly-acquired and continually-updated data sets. This evidence, with much of its focus on growth and development, calls for a macroeconomic approach to the study of misgovernance, an approach that can yield insights into the aggregate effects of corruption and provide answers to some puzzling observations. Within this context, our analysis makes a timely contribution by re-visiting the issue of the organisation of corruption from a macroeconomic perspective that relates well to the current climate of concern and debate.

The remainder of the paper is structured as follows. In Section 2, we present a description of the model. In Section 3, we solve for the general equilibrium of the model. In Section 4, we compare and contrast the implications of alternative forms of corruption. In Section 5, we make a few concluding remarks.

2 The Model

We consider a small open economy in which there is a constant population of two-period-lived agents belonging to overlapping generations of dynastic families. Agents of each generation are divided into two groups of citizens - private individuals (or households) and public servants (or bureaucrats). The former are differentiated further into skilled and unskilled workers, who supply labour to firms involved in different production activities. The latter are homogeneous and employed by the government in the administration of public policy. To fix ideas, we normalise the size of each group of households to 1 and set the size of the bureaucracy to S.[12] Productive activity takes place in two sectors - a final output sector in which a single consumption good (the numeraire of the economy) is manufactured, and an intermediate input sector in which a variety of differentiated producer goods are created.[13] At any point in time, t, there is a fixed unit mass of final output firms, an endogenously-determined number, M_t, of existing intermediate input firms and an endogenously-determined number, N_t, of potentially new intermediate input firms. Each type of intermediate input is indexed by $i \in (0, M_t)$, with M_t representing the most recently invented variety. Invention occurs through research and development by each of the N_t new entrepreneurs, a

[12] As in other analyses (e.g., Blackburn et al. 2006; Rivera-Batiz 2001; Sarte 2000), we abstract from issues relating to occupational choice by assuming that individuals are separated exogenously at birth according to their skills or through some random selection process. In doing so we are able to simplify the analysis by not having to consider possible changes in the size of the bureaucracy and possible changes in the level of corruption that may result from this.

[13] Implicit in our analysis is the assumption that intermediate goods are non-tradeable.

venture that is risky and that requires licenses from all public officials to be undertaken. Successful research and development leads to an expansion in the number of intermediate goods which raises efficiency in output production and provides the mechanism for endogenous growth. All markets are perfectly competitive, except the market for intermediate inputs which is characterised by monopolistic competition.

Since the key features of the model lie in the production side of the economy, we make appropriate assumptions about the circumstances of agents that enable us to simplify and focus the analysis. These assumptions mean that, aside from rent-seeking activity on the part of public officials, the behaviour of agents is largely unimportant and can be essentially ignored in the determination of equilibrium growth. For this reason, our description of the economy proceeds by focusing exclusively on the behaviour of firms.[14]

2.1 Final Output Firms

The representative firm engaged in final manufacturing combines l_t units of unskilled labour with $x_t(i)$ units of intermediate good i to produce y_t units of consumption good according to

$$y_t = A l_t^{1-\alpha} \int_0^{M_t} x_t(i)^{\alpha} di, \tag{1}$$

$(A > 0, \alpha \in (0,1))$. The firm hires labour from households at the wage rate w_t and rents each intermediate input from the producer of that input at the price $p_t(i)$. Profit maximisation implies the following factor demands:

$$l_t = \frac{(1-\alpha) y_t}{w_t}, \tag{2}$$

$$x_t(i) = \frac{\alpha y_t}{M_t P_t} \left(\frac{p_t(i)}{P_t} \right)^{\frac{1}{\alpha-1}}. \tag{3}$$

where $P_t = \left[\frac{1}{M(t)} \int_0^{M(t)} p_t(j)^{\frac{\alpha}{\alpha-1}} dj \right]^{\frac{\alpha-1}{\alpha}}$, the aggregate price index. These are the usual expressions that arise from equating the marginal product and marginal cost of each factor. The expression in (2) shows that the demand

[14]The underlying behaviour of agents is summarised as follows. Each agent (a private or public citizen) works only when young and consumes only when old. An agent works by supplying inelastically one unit of labour endowment to his particular occupation in return for a wage. This, and any other, income is saved at the exogenously given world rate of interest. All agents are risk neutral, deriving linear utility from retirement consumption which is financed from savings.

for labour is a decreasing function of the wage, whilst the expression in (3) shows that the demand for each intermediate input is a decreasing function of the relative price of that input.

2.2 Intermediate Input Firms

An intermediate good is created from a design, or blueprint, that arises out of successful innovation by firms engaged in research and development activity. By way of ensuring the existence of such activity, we assume that any firm which innovates has a perpetual monopoly right over the use of its design (i.e., over the manufacture and sale of its newly-invented product). No other firm can ever exploit the same design to produce the same type of intermediate good.[15] Given this, then any firm that innovates can expect to make positive profits each period so that the incentive to undertake research and development is always preserved.

Research is conducted using skilled labour and previously accumulated, generally available knowledge. We denote by $h_t(j)$ the amount of labour employed by the jth research firm and approximate the currently available stock of disembodied knowledge by the existing stock of designs, M_t. Each firm then has $e_t(j) = h_t(j)M_t$ efficiency units of input with which to undertake its research.[16] The technology for doing this is described by the function $q(e_t(j))$ which gives the probability of successful innovation (i.e., the probability of designing a new product). We assume that this function satisfies the following properties: $q'(\cdot) > 0$ and $q''(\cdot) < 0$ (concavity); $q(0) \geq 0$ and $\lim_{e_t(j)\to\infty} q(\cdot) \leq 1$ (boundedness); and $e_t(j)q'(\cdot) < q(\cdot)$ (elasticity less than one). The first property implies that there are diminishing returns to research. As in other analyses (e.g., Blackburn and Hung 1998; Blackburn et al. 2000; Jones 1995a; Stokey 1995), this feature is intended to capture

[15]For simplicity, we suppose that both the invention and production of an intermediate good are undertaken by the same firm. Equivalently, one could assume separate sectors of innovators and manufacturers, with the former selling their designs to the latter.

[16]The inclusion of M_t as an input to research and development is meant to capture the well-established idea that there are positive externalities associated with this activity. Essentially, we utilise M_t to symbolise the current state of knowledge embodied in the design of intermediate goods. As argued by Romer (1990), such knowldege is fundamentally non-rival in the sense that one person's use of it does not detract from the ability of others to use it. Thus, whilst an innovator may be able to exclude imitators from directly profiting from a new design (e.g., by taking out patent protection that gives him the sole rights over the use of his invention), the knowledge incorporated in that design is available to everyone. In this way, the creation of new knowledge through research and development has positive spillover effects on all those engaged in this activity. Similar effects arise from learning-by-doing in other types of endogenous growth model.

the notion of 'crowding', meaning the duplication of research effort in the presence of a limited stock of ideas: that is, a doubling of research input need not result in a doubling of research output because some of the research may be redundant. The second property is simply a requirement that the probability of successful innovation lies in the unit interval. And the third property ensures the existence of a unique equilibrium with positive innovation activity.[17]

For research to be undertaken, a firm must acquire licenses from public officials. These licenses, or permits, are complementary in the sense that all of them are required, though each one is issued separately by a different bureaucrat. In the absence of any rent-seeking, licenses are issued free of charge. In the presence of rent-seeking, licenses are granted only in exchange for bribes. Let b denote the bribe paid by a firm to a bureaucrat in return for a particular license. The determination of b is an issue to which we turn later: it is the issue that lies at the core of our analysis and we prefer to deal with it subsequently after completing our description of the basic growth framework.[18] For now, we simply note that bribes are determined optimally according to the objectives of bureaucrats and the structure of the bureaucracy, the latter being the key aspect of the decision problem. We also note that, whatever the circumstances, the optimal bribe chosen is, indeed, a constant, $b_t = b$ for all t. Since each and every bureaucrat demands this kickback, the total amount of bribe payment that the firm must make is $B = Sb$. Having made this payment, the firm can then engage in research activity by incurring a fixed cost of κ units of output and hiring skilled labour at the wage rate W_t.

Given the above, we may deduce the expected net payoff from innovation. Let $\pi_t(j)$ be the per-period profit that a firm could earn from designing and selling a new intermediate good. With probability $q(\cdot)$, the firm succeeds in its research and is entitled to the entire future stream of these profits. With probability $1-q(\cdot)$, the firm fails in its research and earns nothing. It follows that the expected net return to the firm is

[17]This last property is necessarily satisfied if, in addition to the other properties, $q'(0)$ is some finite value. It is worth noting that our choice of research technology is based not only on its apparent plausibility, but also on its advantages over more simple (linear) specifications that are often used. Such specifications imply an indeterminate number of research firms, do not accord very well with the notion of a bounded probability of innovating, and inevitably give rise to questionable scale effects (e.g., Blackburn and Hung 1998; Blackburn et al. 2000; Jones 1995a,b).

[18]In this way we seek to provide a self-contained account of the mechanics of growth, which will set the scene well for our subsequent analysis.

$$V_t(j) = q(e_t(j)) \sum_{\tau=1}^{\infty} (1+r)^{-\tau} \pi_{t+\tau}(j) - \frac{W_t}{M_t} e_t(j) - \kappa - B. \tag{4}$$

This is the payoff that each individual prospective designer of an intermediate good would expect to make by choosing to enter the research sector. Such entry is not costless since the only way to embark on research activity is to pay bribes beforehand. This acts as an additional fixed cost which must be taken into account by potential innovators. For each one of these, the condition that determines participation (non-participation) in research and development is $V_t(j) \geq 0$ ($V_t(j) < 0$). Evidently, this condition is influenced by a number a factors, not least of which is the size of bribe payment. We explore this in detail in our subsequent analysis, where we show how the level of bribes determines the equilibrium number of firms that choose to embark on product design (i.e., the equilibrium size of the research sector).

There are two separate optimisation problems confronting an intermediate goods firm. The first problem is to choose a level of labour input, $h_t(j)$, that maximises its expected payoff in (4). The solution to this is

$$M_t q'(e_t(j)) \sum_{\tau=1}^{\infty} (1+r)^{-\tau} \pi_{t+\tau}(j) = W_t. \tag{5}$$

The second problem is to choose a price for its product, $p_t(j)$, that maximises its operating profits, $\pi_t(j)$. It does this by acting as a monopolistic competitor, taking into account the effect of its price on the demand for its product in (3). We assume that, once invented, an intermediate good costs μ units of output to produce. Consequently, $\pi_t(j) = [p_t(j) - \mu] x_t(j)$ and the optimal price is given by the standard constant mark-up rule,

$$p_t(j) = p = \frac{\mu}{\alpha}. \tag{6}$$

3 General Equilibrium

The solution of the model is a symmetric, dynamic general equilibrium in which the economy evolves along a balanced, endogenous growth path. As indicated previously, growth occurs through an expansion in the number of intermediate inputs as a result of research and development. The equilibrium is computed by using the results obtained so far in conjunction with certain other observations. In particular, we note that in our underlying model of agents' behaviour we assume that each skilled worker and each unskilled worker supplies one unit of labour inelastically to their respective occupations (product design and final output production). Given this, we can then determine the market clearing conditions for both types of labour.

Symmetry arises by virtue of (6) which shows that the price of each and every intermediate good is the same (and constant). This implies an aggregate price of $P_t = p$ as well. From above, equilibrium in the market for unskilled labour requires $l_t = 1$. It therefore follows from (1), (2) and (3) that

$$y_t = Ax^{\alpha} M_t, \tag{7}$$

$$w_t = (1-\alpha) y_t, \tag{8}$$

$$x_i(i) = x = \left(\frac{\alpha^2 A}{\mu} \right)^{\frac{1}{1-\alpha}}. \tag{9}$$

The expressions in (7) and (8) imply that both the level of final output and the wages of unskilled labour grow at the same rate as the number of intermediate goods. The expression in (9) shows that the quantity demanded of each intermediate good is identical (and constant).

Given the above, it is evident that each intermediate goods firm makes the same fixed amount of operating profits, $\pi_t(j) = \pi = (p - \mu)x$. Consequently, $\sum_{\tau=1}^{\infty} (1+r)^{-\tau} \pi_{t+\tau}(j) = \frac{\pi}{r}$. In addition, free entry into research and development drives the expected net payoff in (4) to zero. Together with (5), these results imply that each firm engaged in research and development uses the same fixed amount of research input, $e_t(j) = e$, as determined by

$$[q(e) - eq'(e)]\pi = r(\kappa + B). \tag{10}$$

From this we may deduce the following.

Lemma 1 *Given that* $\lim_{e \to 0} [q(\cdot) - eq'(\cdot)]\pi < r(\kappa + B)$, $\exists$ *an* $e = \varepsilon(B) > 0$ *such that* $\varepsilon'(\cdot) > 0$.

Proof. Define $Q(e) = q(\cdot) - eq'(\cdot)$. Since $Q'(\cdot) = -eq''(\cdot) > 0$, then provided that $\lim_{e \to 0} Q(\cdot)\pi < r(\kappa + B)$, $\exists$ a unique value of $e > 0$ that satisfies $Q(e)\pi = r(\kappa + B)$. Hence $e = \varepsilon(B)$, where $\varepsilon'(\cdot) = \frac{r}{Q'(\cdot)\pi} > 0$. ■

The above result shows that, for each individual firm engaged in product design, the equilibrium level of research input, e, is an increasing function of the bribe payment, B. To understand this, note that (10) may be interpreted as determining the number of new designers, N_t, for any given stock of existing designs, M_t. This follows from the fact that, since $h_t(j) = h_t$, equilibrium in the market for skilled labour requires $N_t h_t = 1$ so that $e = \frac{M_t}{N_t}$. As noted above, the term $[q(\cdot) - eq'(\cdot)]$ in (10) is an increasing function of e or, equivalently, a decreasing function of N_t.[19] Given this, then neither

[19] Note also that the term, itself, is positively-valued by our earlier assumptions.

$[q(\cdot) - eq'(\cdot)]\pi > r(\kappa + B)$ nor $[q(\cdot) - eq'(\cdot)]\pi < r(\kappa + B)$ can be an equilibrium outcome. In the first case the existence of positive profits would lead more firms to enter the research sector, implying that N_t would increase until the condition held with equality; the increase in N_t is equivalent to a decrease in e, or a decrease in h_t, meaning that each firm, individually, operates at a smaller scale. In the second case the prospect of negative profits would cause some firms to leave the research sector so that N_t would decrease until the condition held with equality again; the decrease in N_t equates to an increase in e, or an increase in h_t, implying that each firm, individually, expands its scale of operations. Now, suppose that either of these scenarios was to arise because of a change in the size of bribe payment (a fall in B in the case of the former, or a rise in B in the case of the latter). Then one obtains the result that N_t and B are negatively related, whilst e and B are positively related (as summarised by the function $\varepsilon(\cdot)$).

Evidently, the fact that e is a constant means that N_t must grow at the same rate as M_t. The same can be said about the wages of skilled labour since (5) yields

$$M_t q'(e)\pi = rW_t. \tag{11}$$

It remains to determine the equilibrium growth rate, itself. Given that the probability of successful of innovation is independent across designers, then the flow of new designs is $M_{t+1} - M_t = q(\cdot)N_t$. Denoting the growth rate of new designs by $g_t = \frac{M_{t+1}-M_t}{M_t}$, we arrive at the following result.

Lemma 2 *Given Lemma 1, the economy exhibits a constant equilibrium growth rate of* $g = \gamma(e) > 0$*, where* $\gamma'(\cdot) < 0$.

Proof. Using $e = \frac{M_t}{N_t}$, it follows that $g_t = g = \frac{q(e)}{e} \equiv \gamma(e)$, where e is determined in Lemma 1. Hence $\gamma'(\cdot) = \frac{eq'(\cdot)-q(\cdot)}{e^2} < 0$. ■

As shown already, g is the growth rate for all other (non-stationary) variables as well. In the absence of any transitional dynamics, the economy evolves perpetually over time in a steady state, balanced growth equilibrium characterised by an increasing variety of intermediate goods associated with an increasing number of firms engaged in research and development.

The equilibrium growth rate depends only on the quantity of research input, e, which is determined according to (10). The constancy of e explains why long-run growth is sustainable in spite of there being diminishing returns in the research technology. As the economy expands, there is an increase in the number of intermediate goods and an increase in the number of firms engaged in innovation. Each of these firms is able to exploit a wider range of

ideas (because of the externalities from research), whilst being led to operate at a smaller scale (because of the greater competition for skilled labour). The upshot is that the probability of successful innovation remains constant and that the economy, as a whole, experiences greater research activity which enables it to sustain a constant growth rate of new designs.

4 Corruption and Growth

We are now in a position to address the main issue of concern to us - namely, the impact of corruption on growth under alternative corruption regimes. Corruption in our model takes the form of bribes paid by firms to bureaucrats in exchange for licenses to undertake research and development. One may think of bureaucrats as being able to extract bribes by being able to simply reject license applications outright, or to delay the applications process (which can be crucial for innovation), if firms are not willing to comply with their demands. We assume that bureaucrats can do this without any risk of detection or punishment. This assumption (used in other analyses) is intended primarily as a simplification, though it is probably near the mark for many developing countries where the will and wherewithal to combat corruption are relatively weak.[20] The way that bribe-taking influences growth, and the way that this depends on how bribes are chosen, are the two matters that occupy the remainder of our analysis.

The total bribe payment that a firm has to pay in order to engage in research activity is given by B. This payment acts like an additional fixed cost to the firm and the effect of it on growth is realised straightforwardly as follows.

Proposition 1 *An increase in the level of bribes reduces equilibrium growth.*

Proof. From Lemmas 1 and 2, the equilibrium growth rate can be written as $g = \gamma(\varepsilon(B)) \equiv \Gamma(B)$. Hence $\Gamma'(\cdot) = \gamma'(\cdot)\varepsilon'(\cdot) < 0$. ■

[20] Even when governments strive to be vigilant, corruption may thrive for a number of reasons, such as the prohibitive costs of fighting it when resources are scarce, the inherent difficulties in detecting it when monitoring is imprecise and the innate problems in exposing it when monitoring is abused. The last of these possibilities (where those appointed as vigilance officers are themselves open to bribes) bears on the interesting and complex issue of corruption in hierarchies (e.g., Basu et al. 1992; Marjit and Shi 1998; Mishra 2002). From a normative perspective, it has been shown by Bose (2004) how imperfect vigilance, combined with direct penalties for bribe-taking, may lead to outcomes that are Pareto-inferior to those that would occur if no sanctions were applied at all. Some specific examples of anti-corruption strategies are discussed later in the paper.

This result arises as follows. An increase in bribe payments increases the costs of research and development. As we have seen, this causes an increase in the level of research input, e, for each firm that chooses to embark on such a venture, but it does so only by reducing the total number of such firms, N_t. The net effect is that, whilst each designer, individually, operates at a larger scale, the economy, as a whole, suffers a decline in research activity.[21] In short, corruption impedes growth by limiting entry into the business of innovation. There is, of course, an obvious implication of this.

Corollary 1 *The growth rate of a corrupt economy is always lower than the growth rate of a non-corrupt economy.*

Proof. The growth rate is $g = \Gamma(B)$. Since $\Gamma'(\cdot) < 0$, then $\Gamma(B) < \Gamma(0)$ for any $B > 0$. ■

Having established the above, we now consider how bribe payments, themselves, are determined. Recall that $B = Sb$, where S is the number of bureaucrats and b is the bribe that each bureaucrat demands. We study two alternative scenarios: the first - disorganised corruption - is when each bureaucrat acts as an independent monopolist, choosing a level of bribe that maximises his own illegal income without consideration of the aggregate implications of bribe-taking. The second - organised corruption - is when the bureaucracy, as a whole, acts as a joint monopoly, choosing a level of bribe that maximises the illegal income of all (or each) of its members and acknowledging the aggregate effects of its behaviour. In both cases we assume that bureaucrats, whilst never being caught, incur some costs from their corrupt activities. These costs may be thought of in a number of ways. For example, corrupt public officials may need to spend effort and resources on arranging and concealing their illicit transactions, and may also experience some moral shame or social stigma from abusing their privileged positions. It is plausible to imagine that these costs are higher the larger is the scale of the particular offence. We capture this conveniently in terms of a convex cost function that is increasing in the amount of bribe extracted from each firm. This function is given by $\beta(b)$ which is further assumed to satisfy $\beta(\cdot) = b$ at both $b = 0$ and some $b = b^* > 0$. These properties ensure that, at least upto some level of bribe, a bureaucrat's net payoff from bribe-taking is positive

[21] Tracing back our steps, we have $g = \Gamma(B) = \frac{q(\varepsilon(B))}{\varepsilon(B)} = \frac{q(e)}{e}$, where $e = \frac{M_t}{N_t}$. From our discussion of Lemma 1, both the numerator and denominator of this expression increase with an increase in B (because of the decrease in N_t). The latter effect more than offsets the former effect so that the net result is a fall in g.

(i.e., $b - \beta(\cdot) > 0$ for $b \in [0, b^*]$).[22] The bureaucrat's total net payoff from rent-seeking is given by $I_t = N_t[b - \beta(\cdot)]$, or

$$I_t = M_t \left[\frac{b - \beta(b)}{e}\right] \tag{12}$$

Evidently, for any given M_t, I_t is maximised by maximising the term in $[\cdot]$. Recall from above that corruption has the effect of reducing the number of research firms, N_t, causing an increase in research input, e, but an overall reduction in growth. In other words, a higher demand for bribes implies a lower bribe base. The difference between disorganised and organised corruption lies in the extent to which bureaucrats take account of this effect when choosing their optimal bribes.

When corruption is disorganised, each bureaucrat chooses his own level of bribes, b, taking as given the bribes demanded by others and hence the total bribe payment, B, that each firm has to make. In doing so, each bureaucrat perceives that his own corrupt behaviour has no influence on N_t and therefore e. The optimal bribe in this case - denoted b^D - is given simply by

$$\beta'(b^D) = 1. \tag{13}$$

It follows from the properties of $\beta(\cdot)$ that $b^D < b^*$ and therefore $b^D - \beta(b^D) > 0$.[23]

When corruption is organised, the collective bureaucracy recognises that the total bribe payment of a firm depends on the amount of bribe paid to each of its members: that is, it appreciates the fact that $B = Sb$. As such, the bureaucracy is aware that its choice of b will influence N_t and therefore e. One may think of the bureaucracy as making this choice so as to maximise the individual payoff of its representative member, or the aggregate payoff of all of its members. Either way, the optimal bribe in this case - denoted b^O - satisfies

$$\varepsilon(Sb^O)[1 - \beta'(b^O)] - S\varepsilon'(Sb^O)[b^O - \beta(b^O)] = 0. \tag{14}$$

As above, $b^O < b^*$ so that $b^O - \beta(b^O) > 0$.[24]

A comparison of (13) and (14) leads to the following result.

[22] This follows from the convexity of $\beta(\cdot)$, implying that $\beta'(\cdot) > 0$ and $\beta''(\cdot) > 0$. In addition, $\beta'(0) < 1$ and $\beta'(b^*) > 1$.

[23] It also follows that the optimal bribe is constant, as claimed earlier.

[24] That $b^O < b^*$ may be seen from (14) which implies that a bureaucrat's payoff is decreasing at b^* (since $\beta'(b^*) > 1$ and $b^* = \beta(b^*)$). It is also evident that the optimal bribe is constant in this case as well.

Proposition 2 *The level of bribes under organised corruption is lower than the level of bribes under disorganised corruption.*

Proof. Recall that $\varepsilon'(\cdot) > 0$, together with $b^D - \beta(b^D) > 0$ and $b^O > \beta(b^O)$. Suppose that $b^O \geq b^D$. Then (13) would imply $\beta'(b^O) \geq 1$, in which case (14) would require $S\varepsilon'(Sb^O)[b^O - \beta(b^O)] \leq 0$ which is never satisfied. Hence $b^O \geq b^D$ cannot be true. Suppose, alternatively, that $b^O < b^D$. Then (13) would imply $\beta'(b^O) < 1$, in which case (14) would require $S\varepsilon'(Sb^O)[b^O - \beta(b^O)] > 0$ which is satisfied. Hence $b^O < b^D$ is the only feasible outcome. ■

The intuition for this result is that an organised bureaucracy internalises the negative externalities that arise from individualistic (non-coordinated) rent-seeking behaviour. That is, the bureaucracy takes account of the fact that an increase in the amount of bribe payment to each of its members reduces the number of firms from which bribes can be extracted. The effect of this is to temper the demand for bribes, an effect that is absent when bureaucrats act alone and treat the number of potential bribe payers as given.

Given the above, it is straightforward to deduce the different growth implications of alternative forms of corruption.

Proposition 3 *Growth is higher under organised corruption than under disorganised corruption.*

Proof. The growth rate is $g = \Gamma(B)$, where $\Gamma'(\cdot) < 0$. Since $B^O < B^D$, then $\Gamma(B^O) > \Gamma(B^D)$. ■

The fact that bribe payments are lower when corruption is organised than when it is disorganised means that the fixed cost of research and development is also lower in the case of the former than in the case of the latter. A lower cost of research encourages a greater number of firms to undertake research activity and thereby leads to a higher growth rate.

We emphasise that the above result is not meant as a prescription for the organisation of corruption to be a policy objective. Whether organised or not, corruption is always bad for growth in our model and the best policy is to eliminate it altogether. What the result does show, however, is that the effects of corruption may be very different under different circumstances, which may help to explain why some countries of the world appear more immune than others to equally poor quality levels of governance.

5 Discussion

Our analysis has sought to make further in-roads to the study of the macroeconomics of misgovernance. There are a number of aspects worth highlighting and a number of issues worth reflecting upon. We single out just a few of these which we regard as meriting most attention.

5.1 The Organisation of Corruption

Our distinction between organised and disorganised corruption focuses on the extent to which bureaucrats take into account the aggregate effects of their rent-seeking behaviour. Based on this, we arrive at the result that organised corruption is less damaging to growth because it tempers the demand for bribes. As far as we aware, there is no empirical study that provides direct evidence on the consequences of alternative corruption regimes. There is, however, some fairly persuasive indirect evidence which lends support to the general predictions of our analysis and which invites one to think of other aspects that may be important.

Fisman and Gatti (2006) present a simple bargaining model of rent-seeking in which firms and bureaucrats negotiate over bribe payments that enable the former to circumvent various regulations. The analysis seeks to explore how the negotiating process may be affected by the institutional context within which it takes place. According to the authors, institutions are important for governing the extent of bargaining frictions which determine the amount of time that is spent (wasted) on bargaining. The key result of the analysis is that the amount of bribes paid is an increasing function of that time. Using data from the World Bank's World Business Environment Survey, the authors find evidence to support this result with the estimation of a statistically significant positive correlation between bribes and time spent on bribe negotiations.[25] The implication is that an institutional framework with relatively few bargaining frictions is conducive to relatively low levels of bribe payments. The example that immediately comes to mind is that of an organised bureaucracy which allows for more efficient bargaining than a disorganised bureaucracy by eliminating the need for individuals to engage in a myriad of separate bilateral negotiations with different officials. In doing so, it can also reduce uncertainty for individuals by making bribe payments

[25] As indicated earlier, Kaufmann and Wei (2000) obtain a similar correlation, though the interpretation is rather different. In that analysis the focus is on the opposite direction of causation as the objective is to test the "speed money" hypothesis which implies that higher bribes ought to reduce the amount of time spent negotiating - an implication that is at odds with the positive correlation between these variables.

more transparent and predictable.[26] In a further set of regressions Fisman and Gatti (2006) seek to capture this idea with a proxy for uncertainty that measures the extent to which firms know in advance what bribe payments they will be making. The authors find that greater uncertainty (meaning greater bargaining frictions) strengthens the positive relationship between bribes and time spent negotiating.

Corruption-induced uncertainty is the subject of other empirical studies which argue in the same way as above - that is, the extent of such uncertainty depends on the organisational structure of the bureaucracy. Campos et al. (1999) examine the effect of corruption-induced uncertainty on investment using data from the World Bank's World Development Report. The effect is found to be large, negative and statistically significant. Similarly, Wei (1997) uses data from the World Economic Forum's Global Competitiveness Report to investigate how the predictability of corruption affects foreign direct investment. Again, the effect is found to be strongly and significantly negative. To the extent that the degree of uncertainty depends on the type of corruption regime, these results support the idea that a more organised regime is less damaging to growth.

5.2 The Costs of Corruption

There are many ways in which corruption can impact on economic behaviour and impose economic losses on society: it can damage incentives and destroy opportunities; it can distort price signals and deplete resources; and it can create uncertainty and compromise public policy. Our focus in this paper has centred on one of the most pervasive channels through which corruption is known to work - namely, the costs of doing business.

The specific mechanism by which corruption retards growth in our model is a reduction in innovative activity as firms face an extra cost of having to pay bribes to bureaucrats in order to obtain licenses to engage in this activity. The relationship between corruption and innovation has yet to be exposed to systematic empirical investigation. The only study of which we are aware is that of Mahagaonkar (2008), who investigates the experience

[26]For example, individuals may be more certain about their total bribe payment when this is decided and received by a single consortium of bureaucrats than when it is the sum of separate payments made to a number of bureaucrats acting on their own. Additionally, as Shleifer and Vishny (1993) point out, there is often uncertainty about bribes because there is often free entry into the business of collecting bribes. A joint monopoly of bureaucrats would have an incentive to limit the number of entrants, in which case uncertainty would be reduced as individuals are assured that they will not be surprised by the approach of additional bribe-seekers.

of African countries using data from the World Bank's Enterprise Survey. The key finding is that, after controlling for various other factors, there is a strong and significant negative correlation between corruption and product innovation. This finding accords well with our description of events.

From a broader perspective, our analysis is in line with the wealth of anecdotal and empirical evidence on the general costliness of doing business when corruption exists. This evidence is flagrantly at odds with the "speed money" hypothesis, the major problem with which (alluded to earlier) is that the institutional hurdles for which corruption is supposed to substitute are often the result of corrupt practices to begin with: that is, the amount of red tape is typically determined by those who stand to benefit from producing too much of it. The literature in this area is replete with examples not only of how red tape and corruption can impose significant costs on firms, but also of how firms often seek to avoid red tape by complying in corruption and of how corruption appears to proliferate the amount of red tape. The following is just a handful of observations that have been made.[27] De Soto (1990) recounts an investigation by the Institute for Liberty and Democracy into the costs of setting up a small, fictitious firm in Peru, a venture that took 289 days of full-time work, with bribe payments being asked for on 10 occasions (and being unavoidable in 2 instances). Kaufmann (1997a) reveals that 64 (44) percent of firms surveyed in the Ukraine (Russia) admitted to paying bribes to overcome red tape, and that 96 (43) percent of firms confessed to making illegal payments to obtain official licenses and permits. Brunetti et al. (1997) observes that, in a survey of firms around the world, red tape and corruption were ranked amongst the highest major obstacles to doing business (especially in the less developed regions). Similarly, the World Bank (2002) reports that between 50 and 80 percent of firms surveyed in developing and transition economies considered red tape and corruption to be significant constraints on their activities. In a subsequent study, the World Bank (2006) estimates that the average length of time to register a new business is usually more than 100 days in the poorer (more corrupt) countries of the world, compared with less than 30 days in most of the richer (less corrupt) nations.

5.3 The Fight Against Corruption

Nowadays, more than ever, the fight against corruption is a global endeavour, with initiatives being taken at both national and international levels to design

[27] Other examples can be found in Bardhan (1984), Bhagwati (1993), De Soto (2000), Kaufmann (1997b), Mbaku (2000) and Sjaifudian (1997).

and implement appropriate anti-corruption strategies.[28] These strategies are many and varied, and none of them are without potential weaknesses. In what follows we discuss briefly a few of the more well-known policy prescriptions, pointing out their possible shortcomings and indicating how some of them may be viewed within the context of our analysis.

One of the most popular proposals for combatting corruption is based on the view that corruption (especially in less developed countries) is largely the result of low public sector pay which induces bureaucrats to supplement their legal earnings with illegal income (e.g., Chand and Moene 1999; Mookherjee 1997). Given that such is the case, it has often been suggested that a simple way of eliminating corruption is to remunerate civil servants with sufficiently high salaries that rid them of the incentives to transgress (e.g., Gould and Amaro-Reyes 1983; Klitgaard 1988). This idea - a type of efficiency wage hypothesis - can be challenged on both theoretical and empirical grounds. At the theoretical level, Besley and McLaren (1993) have argued that the payment of above market salaries to bureaucrats may make sense only under certain conditions. Focusing on the case of bribery and tax evasion, the authors show how such a strategy can be counter-productive in terms of maximising net tax revenues if the incidence of corruption is high and if the monitoring of corruption is poor - which are precisely the circumstances that one associates with less developed countries. From the perspective of our own analysis, it is easy to see how the potential deterioration in public finances resulting from efficiency wage payments may have adverse effects on growth: if these higher wages are paid for by taxes on firms, then there may be fewer numbers of entrants into the research sector because of the lower anticipated profits.[29] At the empirical level, Rijckeghem and Weder (2001) present evidence which offers some support for the efficiency wage approach, but which also indicates that pursuing this strategy is likely to be very costly because of the very high wages that are needed. By contrast, Huther and Shah (2000), Rauch and Evans (2000) and Treisman (2000) find no such evidence, but rather suggest that the payment of high salaries to public officials does little or nothing to reduce corruption.

An alternative strategy for attacking the problem is to make corruption more risky and/or more costly for those who engage in it. This could be

[28] At the national level, many countries (including developing countries) have some form of anti-corruption agency. At the international level, there have been a number of conventions on corruption drawn up by the UN, the EU, the OECD and other organisations with many countries as signatories.

[29] This is true whether taxes are levied directly on the profits of intermediate goods firms, or on the output of final goods firms (in which case, the profits of the former would still be reduced due to a reduction in demand for intermediate goods).

accomplished by increasing the intensity, coverage and precision of monitoring public officials who may then think twice before transgressing because of the higher probability of being exposed and/or the higher costs of avoiding exposure. As above, a proper evaluation of this strategy would need to take account of its other potential consequences: in particular, to the extent that improvements in monitoring do not come free, but rather must be paid for in some way, there may be implications for growth, either in the manner that might occur in our model, or else through some other channel (e.g., the absorption of resources that could have been put to more productive use).

A further approach to the problem is to diminish the opportunities for individuals to gain from corrupt behaviour. One way of doing this might be to increase competition amongst firms, thereby reducing the amount of excess profits from which bribes can be extracted (e.g., Ades and Di Tella 1999). Two potential problems with this, both exemplified by our analysis, are that bribes are often paid up-front before any profits have even been made, and that the squeeze on profits may deter certain types of growth-promoting activities (e.g., innovation). An alternative strategy might be to increase competition amongst bureaucrats. If a governmental good (a license, a permit or some other such document) is obtainable from different officials, then competition between these officials would drive down the amount of bribe that each one demands for the good (e.g., Shelifer and Vishny 1993). As mentioned earlier, however, the success of this may rely on fairly stringent conditions that are not necessarily satisfied in practice (e.g., Bose 2004). In addition, the strategy makes sense only if the governmental goods supplied by multiple bureaucrats are substitutes for each other: if the goods are complements, as is often the case and is the case in our analysis, then competition is an irrelevant issue. A final possible means of reducing the scope for illegal profiteering is deregulation. Bureaucrats would have fewer opportunities to extract rents if there were fewer rules and regulations that gave them such opportunities. There are two main issues at stake here. First, as emphasised above, the amount of red tape is often controlled by those who stand to gain from it so that deregulation may not be an easy exercise. Second, not all rules and regulations exist merely to serve rent-seekers and there may be some positive amount of red tape that is socially optimal; whilst the benefits of red tape are not very well understood, it is possible to conceive of the idea that there could be too much deregulation.

The foregoing discussion illustrates how difficult it is to design anti-corruption strategies that would be sure to work with unmitigated success and that would not involve some sort of trade-off; and this is even assuming that governments, or government-appointed agencies, are truly committed to fighting the problem, and are not without culpability, themselves. One final

point of consideration is how the organisational aspects of corruption might bear on the issue. It is plausible to argue that curbing bureaucratic malpractice poses a greater challenge when bureaucracies are organised than when they are disorganised. A more closely-knit network of rent-seeking officials is likely to be more efficient in plying its trade and to be able to do this with greater confidence of impunity. Operating in concert as a single illegal syndicate, bureaucrats can exchange ideas and share expertise, pooling together their knowledge, resources and connections to identify "best practices" for undertaking and concealing their surreptitious activities. They may have less fear of being reported by colleagues, may enjoy greater privileged in-roads to other areas of public office and may be more able to secure compliance from their superiors. Indeed, the very idea of an organised corruption network within the public sector conjures up images of a disease that is rampant at both administrative and political levels. For these and other reasons, the organisation of corruption can be important not only because of its implications for growth, but also because of its bearing on the fight against corruption.

6 Conclusions

Corruption can take many shapes and forms, and it would be surprising if all types of corrupt activity had the same effect on economic performance. Recent empirical evidence indicates that, whilst many countries have suffered significantly as a result of corruption, others have coped well (in some cases, very well) with the phenomenon. The foregoing analysis suggests that one explanation for this is the extent to which perpetrators of corrupt practices - in our case, bureaucrats - coordinate their behaviour. In the absence of an organised corruption network, each bureaucrat demands his own bribe payment whilst ignoring the negative externalities of this on the bribe-taking capacity of others. In the presence of such a network, the collective bureaucracy internalises these externalities and, in doing so, tempers the demand for bribes. The result is that bribe payments are lower, innovation is higher and growth is higher in the case of the latter than in the case of the former.

Like almost all other analyses, our approach has been to focus on the effects of corruption, taking as given that corruption exists (in one form or another). We have not sought to examine how the incidence of corruption, itself, may change endogenously with other changes in the economic environment. This is not necessarily a major shortcoming: aside from the specific objective of our analysis (which is to draw attention to the difference between organised and disorganised rent-seeking), there is the widely-held view that, for many developing countries, corruption has become so ingrained into the

fabric of society that it is unlikely to disappear quickly or easily (if at all). From the perspective of the present paper, the interesting question is not so much why the level of corruption is higher in poor countries than in rich countries, but rather why the nature of corruption appears to vary across countries. The extent to which corruption is organised is one aspect of this, but there are other aspects as well. For example, it is common practice in some countries for arrangements to be made whereby kickbacks from private individuals to public officials are given *ex post* (as a share of profits, for instance), rather than *ex ante* (as an upfront bribe, like in the present analysis), and the presumption is that the effects on the economy will be different in each case. The precise reason why corruption should take one form and not another is an important issue which has been largely neglected and which may well have just as much to do with cultural, social and political considerations as it has with economic circumstances.

The implication of our analysis that corruption is always bad for growth accords with the consensus view among development experts. As we have also shown, however, exactly how bad the effect is can depend on the particular way in which corruption is practised, and there are clearly some types of practice that are less detrimental than others. Given this, then our analysis may be seen as offering a cautionary note against anti-corruption strategies. If fighting corrupt behaviour is costly (e.g., because it uses up resources that could have been employed more productively elsewhere), and if such behaviour is not that harmful, then one ought to be wary of embarking on a fight merely for the sake of it. Anti-corruption agencies need to analyse and understand the nature of corruption before trying to cure it, just as a medical practitioner needs to examine and identify the symptoms of a sick patient before prescribing the appropriate remedy.

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Table 1
Corruption and Growth in
Selected Regions of the World

Region	Corruption Index	% Growth Rate of GDP Per Capita
Sub-Saharan Africa	6.4	0.4
Latin America	6.5	0.1
South and South-East Asia	6.3	4.4
Hong Kong, Malaysia, Singapore	2.8	4.8
Philippines, South Asia	8.1	2.4
China, Indonesia, South Korea, Thailand	7.1	5.9

Note: Figures calculated as averages over 1980-1999 for Sub-Saharan Africa and Latin America and over 1980-1996 for South and South-East Asia.